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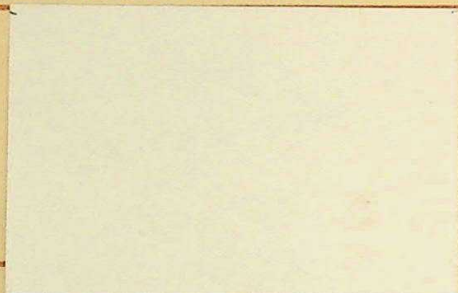
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THE METHOD OF MAKING ANAGLYPHS (TWO-COLOR STEREOSCOPIC PICTURES)

The following information is taken from "Anaglyphs with a Hand Camera" by R.A. Fairthorne, in English Mechanics, January 8, 1926, page 377, and January 15, page 5.

"The Theory of the Anaglyph is very simple. Two pictures are made of the subject by means of a stereo camera or an ordinary hand camera. The right-hand picture is printed in red on a sheet of white paper, and the left-hand picture in green on the top of the other. If now the picture is viewed through a pair of spectacles of which the right-hand glass is green, and the left hand red, the right eye can only see the red picture, which will look black, and the left eye can only see the green picture. Hence the right eye sees the picture as a view of the solid subject as seen by the right eye, and the left eye sees it as the solid object seen by the left eye. The result is that the picture appears in relief. The obvious merits of the method are that the size of the picture is unlimited; it may be viewed by any number of people at the same time (e.g. lantern slides), and that the viewing apparatus is exceedingly cheap. Its disadvantage is that a certain knack is required in viewing the anaglyphs. The knack is, however, quickly acquired.

"Preparation of Anaglyphs. The anaglyphs are prepared by the Pinatype process. Two negatives are taken of the subject, one as seen from the left eye, and the other as seen from the right. Positives are then made on transparency plates, which are sensitized in ammonium bichromate solution and exposed to light through their backs.

"This hardens the gelatine film proportionately to the amount of light that has passed through, i.e., the lightest parts of the positive are the hardest and the darkest are the most soft. The plates are then dyed in their proper colours in Pinatype Complementary Red D and Complementary Green D.

"These dyes have the property of being absorbed by the gelatine in proportion to its softness, and also of migrating from one gelatine surface to another in intimate contact. If, therefore, a piece of gelatine coated paper is squeezed down first on one plate and then on the other, we shall obtain our anaglyph....

"... As the percent dye solution can be used innumerable times before This material, while not guaranteed, has been assembled from existing printed sources available to leading libraries, and which we believe to be reliable. It is prepared by trained library workers of the Encyclopædia Britannica's Library Research Service, a department separate from the Editorial Department and devoted exclusively to library research. The sources used are among those listed in the supplementary reading at the end.

359/464

losing its strength, ten gramme bottle of the solid dye should last the most industrious worker for many months. The gelatine-coated paper is best prepared by fixing out gaslight or bromide paper and hardening in a five-per-cent formalin solution. A matt surface is preferable to a glossy, as the reflections from the latter surface are sometimes obtrusive.

"Gelatized glass for lantern slides are prepared in a similar way by fixing out lantern slide plates.

"The Viewing Spectacles:... For those who prefer to make their own, the Pina Manual gives the following for mulae:

Coloured Gelatine for red glass

Gelatine 6 gms.
Distilled water 100 cc.
20 cc. of a 5 gm. solution of Rapid filter red II in 100 cc. water.

Coloured Gelatine for Green Glass

Gelatine , ... 6 gms.
Distilled water 100 cc.
20 cc. of a 2.5 gm. solution of Filter blue green in 100 cc water.

7 cc. of the above solution to every 100 sq. cm. (16 sq. ins) of glass. ...

"Photographic Information: The negatives can be made either with a special stereo camera or with a hand camera moved the requisite distance between exposures.....

"Making the Pictures: Glass transparencies are taken from the negative in the usual way, using a hydroquinone developer. Alkaline pyro should not be used, as it has a tanning effect on the gelatine. After thorough washing these are placed in the following solution for five minutes:

Ammonium bi chromate, 20 grams
Ammonia solution, (s.g. 0.880), 200 cc.
Distilled water, 1,000 cc.

"The plates are then thoroughly dried in the dark. They are then exposed to the light through the glass side, which should be well cleaned to prevent dark patches on the print. A piece of printing out paper should be placed under the positive as an actinometer. When the details are fully visible on the paper, which will look like a negative, the insolation is complete. The plates are then washed thoroughly to remove undecomposed bichromate. The washing is complete when the drippings from the plates no longer discolour white paper. The washing may be shortened by immersing the plates in a five per cent ammonia solution. Unlike the practice with other Pinatype colours, a bisulphite bath must not be used for this purpose, as the green dye is very sensitive to traces of bisulphite.

"It is obvious that the prints from these plates will be reversed as in a mirror. Therefore, in order that they may be seen in relief when seen through

the standard English viewing masks (right eye green, left eye red), the original right-hand image will be printed in green, the left hand in red. Which plate is which can be determined by consideration of the variation of position of the same object in the two plates. A quicker method is to hold the two plates side by side at arm's length film side towards the eyes, and to look through the plates till they appear to slide over each other and ultimately coincide. If the subject stands out in relief, the left-hand negative is in the left hand, and the right in the right. If however, we get pseudoscopy, that is, the parts that should stand out, stand back, and vice versa, the plates are not in their respective hands....

"The plates should then be immersed in their respective dye baths for half an hour, the dishes being rocked now and again. These baths can be used over and over again and are one per cent solutions of Pinatype Complementary Red D and Green D respectively in distilled water. When re-dyeing the plates they need only to be immersed for three minutes.

"A piece of gelatinized paper, prepared as mentioned above, is soaked in water, for half an hour, the green printing plate rinsed till the drippings are nearly colourless, and the plate and paper are placed together, film to film, under water. They are then taken out, held vertically for a few seconds to draw off surplus water, and placed paper uppermost on the table. A piece of waxed taffeta is placed on the paper for protection, and the whole is squeezed from the centre to the sides with a stiff squeegee. A piece of moist blotting paper is placed on the back of the print to prevent it drying by evaporation. After about eight minutes a corner of the print is lifted slightly to see whether the green image is sufficiently intense. If it is not the corner is squeegeed down again. If it is the print is peeled off and placed on the red plate under water as before. The green image should be of such an intensity that it does not show on the paper when seen through the green spectacle, but shows every detail when viewed through the red spectacle. This is somewhat lighter than might be supposed."

(Continued in English Mechanics, January 15, 1926, page 5.

"When the print is on the red plate and is inspected from the glass side the green image will be seen in black. The paper is shifted till the distance points of this image coincide with the distance point of the image of the printing plate. The paper is then squeegeed down and left till the red image as seen through the green spectacle is as black as the green image seen through the red spectacle. The print is then dried, and the anaglyph is complete.

"In making the distance points coincide, the stereo image stands out of the picture. By making the near points coincide the image will stand back.

"In making lantern slides, the green image prepared in this case from the left-hand positive contrary to the case of paper prints is printed on a fixed out lantern plate, and the red image prepared from the right-hand positive is printed on another plate, and the two are bound together with the film sides in contact, and the images in correct register. It is obvious, therefore, that

the red image must be reversed with regard to the red image on a paper print. The easiest way to do this is to fix out a lantern plate, sensitise it with the bichromate, and to insolate it behind the right-hand positive (which is not sensitised) when dry. This plate is then washed and stained up as before, and is used to print the red image in a similar fashion. The finished slide should be placed in the carrier so that the green image faces the source of light.

"Anaglyph Formulae: When making anaglyphs of apparatus and the like, where the distance points are blocked out, the following relations are useful:

"Distances in inches to the right of the corresponding red point, a point on the green print must be placed, to make the corresponding stereo images stand out D inches in front of the paper.

$$= \frac{2.5 \times D \text{ inches}}{(\text{Distance of observer's eyes from anaglyph} - D)}$$

"Distance in inches of a point on the green print to the left of the corresponding red print required to make the corresponding stereo image stand back D inches behind the paper.

$$= \frac{2.5 \times D \text{ inches}}{(\text{Distance of observer's eyes from anaglyph} + D)}$$

"From these formulae it will be seen that the further the eyes are from a print with given separation, the more elongated is the image in a direction perpendicular to the paper. This is particularly noticeable in anaglyphic diagrams of three-dimensional figures.

"Similarly if the head is moved to the right or left the stereo image appears to bend in the same direction....."

SUPPLEMENTARY READING

Encyclopaedia Britannica, volume 3, page 585, BINOCULAR INSTRUMENT, The Stereoscope.

"Anaglyphs", English Mechanics, 1925, volume 121, page 123.

"Color Stereoscope", Review of Scientific Instruments, September 1945, pages 256-7.

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Judge, A.W. Stereoscopic Photography. London: Chapman and Hall, Ltd., 1926.

"Twin-eye cameras", Business Week, December 8, 1945, page 56-.

Wright, J. "Home-made stereoscope for color slides", American Photography, July 1943, pages 26-7.